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PATENT ABSTRACTS OF JAPAN

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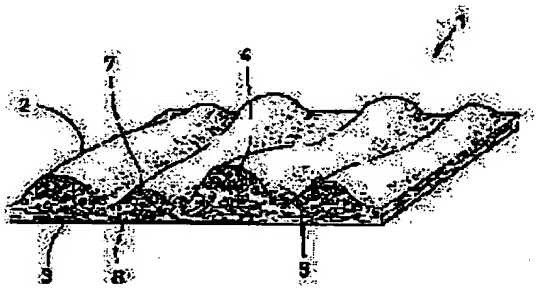
(54) WIPER MADE FROM NONWOVEN FABRIC

(57)Abstract:
PURPOSE: To improve the stain-wiping performance and durability of a nonwoven fabric wiper having many projections.
CONSTITUTION: A web comprising thermally crimping hydrophobic synthetic fibers 7 and a web comprising hydrophilic fibers 8 are laminated to each other, and the produced laminated is jetted with high pressure water on a supporting roll having many fine projections and water drain holes on its smooth surface to interlace and rearrange the fibers 7, 8 with each other. The treated nonwoven fabric irregular in the distribution density of the fibers is subsequently heated to crimp the synthetic fibers 7 and then to obtain the nonwoven fabric wiper 1 wherein only the parts 4 having high densities are protruded.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] A wiper made of a nonwoven fabric characterized by being obtained by manufacture method which consists of fibrin material, and has much boom hoisting at least on one side, and includes the following production process at least.
a. A production process which obtains at least a layered product which consists of much more hydrophilic fiber web and a hydrophobic fiber web of heat crimp nature much more at least.
b. The continuous plane section, and intermittent and a production process which obtains a nonwoven fabric which carries out a rearrangement and has unevenness in the direction of a field of said layered product at distribution density of fiber while injecting high-pressure water from a micropore nozzle to said layered product and carrying out the confounding of the fiber of said both webs on a support surface equipped with much heights and/or a crevice over which it is distributed independently, and many detailed drain holes.
c. A production process to which it heat-treats and crimp of said synthetic fiber is carried out after dehydrating and/or drying said nonwoven fabric.
[Claim 2] A wiper according to claim 1 on which said wiper has average coefficient of friction (MIU) of 0.50-0.70.
[Claim 3] A wiper according to claim 2 whose mean deviation (MMD) of coefficient of friction of said wiper is 0.01-0.02.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the wiper and its manufacture method made of the nonwoven fabric used in order to wipe off dirt.
[0002]
[Description of the Prior Art] Conventionally, this seed wiper and its manufacture method are well-known. For example, according to U.S. Pat. No. 3,616,175, the web which consists of a rayon fiber is put on a wire mesh, high-pressure water can be injected from the micropore nozzle of this web upper part, the confounding of the fiber can be carried out mutually, and a nonwoven fabric similar to a natural chamois skin can be obtained. Moreover, according to JP,60-11148,B, the nonwoven fabric excellent in the surface friction property can be obtained by carrying out the laminating of the mat of the micro fiber which consists of the web and the thermoplastic polymer of the filament which consists of a thermoplastic polymer, carrying out heating pressurization of them intermittently, and joining. The pattern of the mesh remains in the field which was in contact with the wire mesh among both the surface, the striation which became depressed to the part which injected high-pressure water produces the former nonwoven fabric in another field, and they build comparatively detailed irregularity on each surface. Moreover, the confounding of the fiber is carried out mechanically and the touch of a nonwoven fabric is flexible to the whole. Since the portion which carried out heating pressurization welds the latter nonwoven fabric, it becomes thinner than other portions, serves as an impression and builds the concavo-convex large pattern of the difference of elevation on the surface, if dirt is wiped off with this nonwoven fabric, it will act so that that irregularity may scratch dirt.
[0003]
[Problem(s) to be Solved by the Invention] Although it has irregularity on the surface, since it makes detailed and is flexible, the nonwoven fabric to which the confounding of the fiber was carried out with high-pressure water among said conventional technology has the problem of being inferior to the operation which scratches dirt. Since the organization of the welded portion has the difference of elevation firm and large moreover, although the nonwoven fabric which, on the other hand, carried out heating pressurization of the thermoplastic polymer partially is excellent in the operation which scratches dirt, the welded portion loses the gestalt as fiber, and solidifies, and it has the problem of being inferior to the flexible touch.
[0004] Then, this invention builds the nonwoven fabric which injects high-pressure water to the fiber web containing heat crimp nature fiber, and has unevenness in fiber density, and makes it the technical problem to solve the problem of said conventional technology by heating and carrying out crimp of this nonwoven fabric by making finishing and this into a wiper on the surface which consists of much large boom hoisting of the difference of elevation comparatively.
[0005]
[Means for Solving the Problem] The place which this invention makes a means in order to solve said technical problem is as follows.
[0006] It is characterized by being obtained by manufacture method which that wiper made of a nonwoven fabric consists of fibrin material in this invention on the assumption that a wiper made

of a nonwoven fabric, and has much boom hoisting at least on one side, and includes the following production process at least.
a. A production process which obtains at least a layered product which consists of much more hydrophilic fiber web and a hydrophobic fiber web of heat crimp nature much more at least.
b. The continuous plane section, and intermittent and a production process which obtains a nonwoven fabric which carries out a rearrangement and has unevenness in the direction of a field of a layered product at distribution density of fiber while injecting high-pressure water from micropore NOSURU to said layered product and carrying out the confounding of the fiber of said both webs on a support surface equipped with much heights and/or a crevice over which it is distributed independently, and many detailed drain holes.
c. A production process to which it heat-treats and crimp of said synthetic fiber is carried out after dehydrating and/or drying the nonwoven fabric.
[0007] In a mode with this desirable wiper, the average coefficient of friction (MIU) is 0.50-0.70, and mean deviation (MMD) of the coefficient of friction is 0.01-0.02 more preferably.
[0008]
[Function] Thus, in the constituted wiper made of a nonwoven fabric, if high-pressure water is injected to the layered product which consists of a web, while the configuration fiber of a layered product carries out a confounding mutually, a rearrangement can be carried out, it can be relatively accumulated mostly into the perimeter of the heights of a base material, and/or a crevice, and the flexible nonwoven fabric which has unevenness in the distribution density of fiber along the direction of a field of a base material can be obtained. If this nonwoven fabric is heat-treated and crimp of the synthetic fiber is carried out, when many synthetic fibers carry out crimp relatively, the portion with high density will upheave highly compared with a portion with low density, and will form large boom hoisting of the difference of elevation further from boom hoisting which existed in the nonwoven fabric surface at the beginning.
[0009] With this wiper made of a nonwoven fabric, the synthetic fiber which is accumulated on the ridge and which carried out crimp does not lose rigidity in a damp or wet condition, either, and a ridge is not destroyed completely easily.
[0010]
[Example] It is as follows when it explains with reference to the drawing of attachment of the details of the wiper made of a nonwoven fabric concerning this invention.
[0011] Drawing 1 is the typical partial fracture perspective diagram in which expanding a wiper 1 partially and showing it. A wiper 1 has the upper surface 2 and an inferior surface of tongue 3, the upper surface 2 has much boom hoisting which consists of an indeterminate form ridge 4 and a trough [indeterminate form / between ridges 4] 5, and its inferior surface of tongue 3 is flat. While there are many synthetic fibers 7 of the hydrophobicity which is in a crimp condition on the about two upper surface so that clearly [in the cross section of a wiper 1] relatively, many [relatively and] rayon fibers 8 of the shape of direct and the hydrophilicity crooked gently exist in about three inferior surface of tongue and each fiber carries out the confounding of a synthetic fiber 7 and the rayon fiber 8 mechanically, a synthetic fiber 7 and a rayon fiber 8 carry out a confounding mutually, and fiber 7 and 8 forms the nonwoven fabric by it. fiber 7 and 8 — each distribution density (number of the fiber per unit area of a nonwoven fabric) is higher than a trough 5 in a ridge 4.
[0012] This wiper 1 carries out impregnation of water or the drug solution beforehand, and turns and uses the upper surface 2 for objects, such as a table and a wall surface. If water etc. is held at the rayon fiber of hydrophilicity and the force is applied to a wiper 1, it will exude gradually and will make wiping of dirt smooth. The ridge 4 of the upper surface 2 acts so that the dirt of an object may be scratched, and a trough 5 acts as passage for discharging the scratched dirt out of a wiper 1 with water etc. Since it consists of that the hydrophobic synthetic fiber 7 mainly becomes entangled mechanically, although a wiper 1 contains water, a ridge 4 does not fall and does not destroy the rigidity completely easily. Therefore, this wiper 1 has the scraping effect high from beginning to end and the discharge effect of dirt.
[0013] Drawing 2 and 3 are the typical expansion end view showing other embodiments of a wiper 1. The wiper 1 of drawing 2 has a ridge 4 and a trough 5 to the vertical side 2 and 3 each,

and has the synthetic fiber 7 which carried out crimp near the vertical sides 2 and 3 of a ridge 4, and there is a rayon fiber 8 in the middle of the vertical sides 2 and 3. In addition, in a ridge 4, any fiber 7 and 8 of that distribution density is high, being constituted with the synthetic fiber 7 in which the ridge 4 mainly carried out crimp, and fiber 7 and 8 carrying out a confounding mechanically, and forming the nonwoven fabric is the same as that of the mode of drawing 1 . Although the wiper 1 of drawing 3 has a ridge 4 and a trough 5 in the vertical sides 2 and 3 like it of drawing 2 , it differs in that have a rayon fiber 8 near the vertical sides 2 and 3 of a ridge 4, and it has a synthetic fiber 7 in the middle of the vertical sides 2 and 3. There is an advantage that exudation of the water from the vertical sides 2 and 3 becomes prompt in this wiper 1, and since the synthetic fiber 7 which carried out crimp has accomplished the nucleus, the mold collapse of the ridge 4 is not carried out easily. In addition, in drawing 2 and 3, although those locations of trough 5 [ridge 4 of the vertical sides 2 and 3 and] correspond mostly, even if they are not in agreement, it is convenient to the function of a wiper 1.

[0014] Drawing 4 is the mimetic diagram showing the manufacturing process of the wiper 1 shown in drawing 1 . This production process consists of the web supply production process 50, the impregnation production process 51, the first high-pressure water treatment production process 52, the second high-pressure water treatment production process 53, the dehydration desiccation production process 54, a heat treatment process 55, and a winding production process 56.

[0015] the endless belt 60 top it runs rightward [of drawing] in the web supply production process 50 — the — the web 62 of 1 random Weber 61 to hydrophilic fiber 8 — continuous — supplying — continuing — a web 62 top — the — the web 64 of the hydrophobic synthetic fiber 7 of heat crimp nature is continuously supplied from 2 random Weber 63, and the web layered product 65 which consists of both webs 62 and 64 is built.

[0016] In the impregnation production process 51, from the upper part, a stream 66 is gently supplied to the whole width of face of a layered product 65, and carries out impregnation to it, and carrying out smoothly of transit of a layered product 65 is attained by making the conditions settle down.

[0017] In the first high-pressure water treatment production process 52, it has the micropore for wastewater with a diameter of 0.2-2.0mm for a layered product 65 at 5 - 50% of rate of area in a smooth peripheral surface. It leads to the 1st support roll 67 which rotates to the right, and from the injection nozzle 68 of a large number installed successively to the cross direction and the hoop direction of a roll 67, 20-100kg/cm2 high-pressure water is injected at a rate of 0.5 - 20 l/m2, and the confounding of the fiber 7 and 8 which constitutes a layered product 65 is carried out mechanically mutually. The suction means (not shown) for urging wastewater is formed in the 1st support roll 67 interior.

[0018] In the second high-pressure water treatment production process 53, the layered product 65 which carried out the confounding with the 1st support roll 67 is drawn after the 2nd support roll 69 of the RRC which has a hemispherical projection with a diameter [of 0.3-15mm], and a height of 0.4-10mm in the pitch of 1-15mm in a smooth peripheral surface, and has a drain hole with a diameter of 0.2-2.0mm at 2 - 35% of rate of area. This layered product 65 is preferably processed with the water jet of high pressure and high water supply amounts rather than it like said production process 52 by nozzle 69A, from the point of said hemispherical projection, to the perimeter of the end face section, it moves and the rearrangement of the fiber 7 and 8 is carried out. By doing so, many pile up the perimeter of the end face section, and fiber 7 and 8 becomes thin by the point, and forms the nonwoven fabric 70 which has unevenness in the distribution density of fiber in the direction of a plane. In the field which a part of surface of a roll 69 was copied in the field where the nonwoven fabric 70 contacted the 2nd support roll 69, and injected high-pressure water, the striation which became depressed to the injection part arises, and these are building small boom hoisting of the difference of elevation on both the surfaces.

[0019] In addition, with the technical contents of the indication to JP,62-125058,A concerning the same applicant as this application, since the details of the production process from the impregnation production process 51 to the second high-pressure water treatment production process 53 are substantially the same, they omit the explanation.

0020] Next, at the desiccation production process 54, the suction by the vacuum is made to act
›n the nonwoven fabric 70 which is in a damp or wet condition at the front production process
53, and it dehydrates, and warm air is sent further and it dries.
0021] In a heat treatment process 55, a nonwoven fabric 70 is heated even to even whenever
****** <DP N=0004>], and crimp of the synthetic fiber 7 of heat crimp nature is carried out.
The portion which is accumulating the synthetic fiber 7 upheaves by the crimp, a nonwoven
fabric 70 serves as the ridge 4 of drawing 1 , the thin portion of fiber 7 hardly upheaves, serves
as a trough 5, and Ryobe 4 and 5 forms boom hoisting which has the big difference of elevation
which cannot acquire production processes 50–54. Since a nonwoven fabric 70 is mainly
concerned with a synthetic fiber 7 and it exists in the upper surface 2, a ridge 4 and a trough 5
are also mainly formed in the upper surface 2. After this nonwoven fabric's 70 serving as an
original fabric of a wiper 1 and rolling it round at the following production process 56, it is cut out
and used for a necessary size.
[0022] In such a manufacturing process, in order to obtain the more desirable wiper 1, the
common knowledge bicomponent fiber of the side–by–side mold which consists of synthetic resin
which is two kinds from which heat shrink temperature is different as a hydrophobic synthetic
fiber 7, or a sheath–core mold is used in 20 – 80% of the weight of the range of a nonwoven
fabric 70, and natural fibers, such as a rayon fiber and grinding pulp, the synthetic fiber which
carried out hydrophilization processing are used as hydrophilic fiber 8 in 80 – 20% of the weight
of the range of a nonwoven fabric 70. Moreover, for a synthetic fiber 7 or hydrophilic fiber 8, 30
% of the weight is [the 3rd fiber from which they and a property differ] mixable as a limit. For
example, the non–crimp nature synthetic fiber which hits a synthetic fiber 7 to 30% of the weight
of them is mixable. A wiper 1 combines a synthetic fiber 7 and hydrophilic fiber 8 so that the
basis weight may serve as 30 – 200 g/m2, and average coefficient of friction (MIU) of a wiper 1
is 0.50–0.70, and it selects the fineness of these fiber 7 and 8, the degree of crimp, and an
operating rate so that the mean deviation (MMD) of coefficient of friction may fit in the range of
0.01–0.02 preferably. Here, MIU is a slipping hard index, MMD is the index of a rough deposit, and
they are explained by the Textile Machinery Society of Japan issue ("standardization and
analysis" (the 2nd edition) of aesthetic property evaluation) in full detail. The wiper 1 which has
this numerical property is excellent in especially the engine performance that scratches dirt.
[0023] In addition, although drawing 4 explained the layered product 65 of the two–layer
structure which consists of webs 62 and 64, another web can be further put on one of webs, and
the layered product 65 which consists of three layers as a whole can also be used as a wiper 1.
Moreover, at the second high–pressure water treatment production process 53, it can change to
a hemispherical projection and a detailed crevice can also be established in the surface of the
2nd support roll 69. In this case, while the configuration fiber of the layered product 65 which
had high–pressure water injected is flowed in and accumulated into that crevice, it becomes thin
in respect of [of a roll 69] smooth.
[0024]
[Effect of the Invention] Since the wiper concerning this invention has configuration fiber made
of the nonwoven fabric which carried out the confounding mechanically, its touch is flexible. In
the surface, since it has much large boom hoisting of the difference of elevation comparatively,
dirt can be efficiently scratched by the ridge. Since it consists of synthetic fibers which mainly
carried out crimp and the fiber does not lose rigidity in a damp or wet condition, either, this ridge
is not destroyed completely simply.
[0025] This wiper gives unevenness to the distribution density of the hydrophobic synthetic fiber
of heat crimp nature, and since it forms boom hoisting by carrying out crimp of the synthetic
fiber, it can acquire large boom hoisting of the difference of elevation easily further rather than
boom hoisting which can be acquired by the nonwoven fabric manufacturing process.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The typical expansion perspective diagram of a wiper.
[Drawing 2] End view of a wiper showing an example of an embodiment.
[Drawing 3] End view of a wiper showing other examples of an embodiment.
[Drawing 4] The mimetic diagram of the manufacturing process of a wiper.
[Description of Notations]
1 Wiper
2 Upper Surface
3 Inferior Surface of Tongue
4 Ridge
5 Trough
7 Hydrophobic Crimped Staple
8 Hydrophilic Fiber
62 Web
64 Web
65 Layered Product
67 1st Support Roll
69 2nd Support Roll
70 Nonwoven Fabric

[Translation done.]

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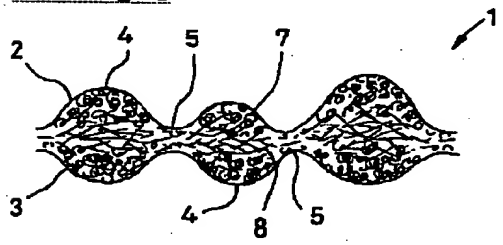
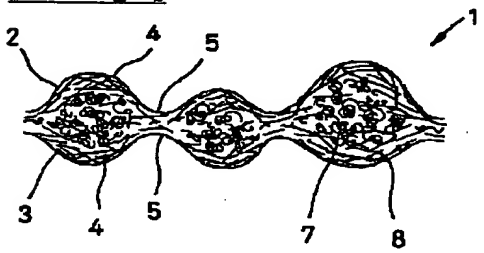
DRAWINGS

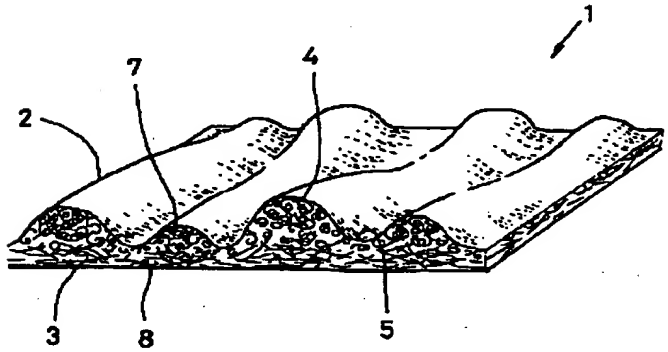
[Drawing 2]



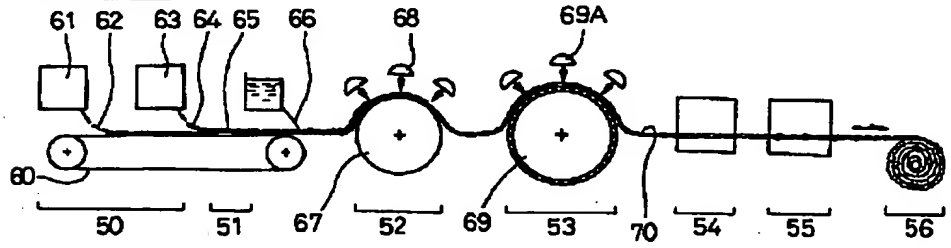
[Drawing 3]



[Drawing 1]



[Drawing 4]



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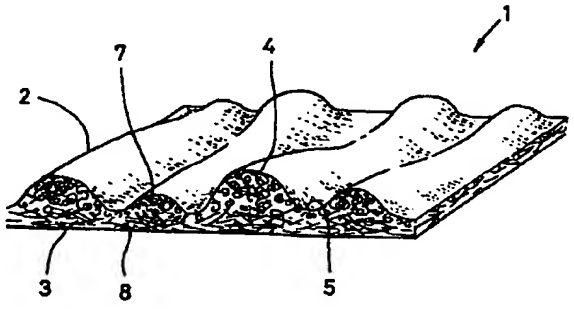
最終頁に続く

(54)【発明の名称】　不織布製ワイパー

(57)【要約】

【目的】　多数の起伏を有する不織布製ワイパーの汚れを掻き取る性能と耐久性とを向上させる。

【構成】　熱捲縮性の疎水性合成繊維７からなるウエブと親水性繊維８からなるウエブとを重ね合わせて積層体をつくり、平滑面上に多数の微細な突起と排水孔とを有する支持ロール上においてその積層体に高圧水を噴射し、繊維７，８を交絡させるとともに再配列し、繊維の分布密度にむらのある不織布をつくる。この不織布を加熱して合成繊維７を捲縮させることにより、密度の高い部分のみを隆起させて不織布製ワイパー１を得る。



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【特許請求の範囲】

【請求項１】繊維素材からなり、少なくとも片面に多数の起伏を有し、かつ少なくとも次の工程を含む製造方法によって得られることを特徴とする不織布製ワイパー。

ａ．少なくとも一層の親水性繊維ウエブと、少なくとも一層の熱捲縮性の疎水性繊維ウエブとからなる積層体を得る工程。

ｂ．連続した平面部と、間欠的かつ独立して分布する多数の凸部および／または凹部と、多数の微細排水孔とを備えた支持体表面上において、前記積層体に微細孔ノズルから高圧水を噴射し、前記両ウエブの繊維を交絡させるとともに再配列して前記積層体の面方向に繊維の分布密度にむらを有する不織布を得る工程。

ｃ．前記不織布を脱水および／または乾燥したのち、熱処理して前記合成繊維を捲縮させる工程。

【請求項２】前記ワイパーが０．５０～０．７０の平均摩擦係数（ＭＩＵ）を有する請求項１記載のワイパー。

【請求項３】前記ワイパーの摩擦係数の平均偏差（ＭＭＤ）が０．０１～０．０２である請求項２記載のワイパー。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】この発明は、汚れを拭き取るために使用する不織布製のワイパーとその製造方法に関する。

【０００２】

【従来の技術】従来、この種ワイパーとその製造方法は、公知である。例えば、米国特許第３，６１６，１７５号によれば、レーヨン繊維からなるウエブをワイヤーメッシュに載せ、該ウエブ上方の微細孔ノズルから高圧水を噴射して繊維を互いに交絡させ、天然セーム皮に類似の不織布を得ることができる。また、特公昭６０－１１１４８号公報によれば、熱可塑性重合体からなるフィラメントのウエブと熱可塑性重合体からなるマイクロファイバーのマットとを積層し、それらを間欠的に加熱加圧して接合することにより表面の摩擦特性に優れた不織布を得ることができる。前者の不織布は、その両表面のうちワイヤーメッシュに接していた面にはそのメッシュの模様が残り、もう一方の面には高圧水を噴射した部位にくぼんだ条痕が生じて、それらが各表面に比較的微細な凹凸をつくる。また、繊維は機械的に交絡し、不織布は全体に肌触りが柔軟である。後者の不織布は、加熱加圧した部分が融着してその他の部分よりも薄くなってくぼみとなり、表面に高低差の大きい凹凸模様をつくるから、この不織布で汚れを拭き取ると、その凹凸が汚れを掻き取るように作用する。

【０００３】

【発明が解決しようとする課題】前記従来技術のうち、高圧水で繊維を交絡させた不織布は、表面に凹凸を有するものの、それが微細にして柔軟であるから、汚れを掻き取る作用に劣るという問題がある。一方熱可塑性重合体を部分的に加熱加圧した不織布は、融着した部分の組織が強固であってしかも大きい高低差を有するから汚れを掻き取る作用に優れているものの、融着した部分が繊維としての形態を失って固化してしまい、柔軟な肌触りに劣るという問題がある。

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【０００４】そこで、この発明は、熱捲縮性繊維を含む繊維ウエブに高圧水を噴射して繊維密度にむらのある不織布をつくり、この不織布を加熱して捲縮させることにより多数の比較的高低差の大きい起伏からなる表面に仕上げ、これをワイパーとすることによって前記従来技術の問題を解決することを課題にしている。

【０００５】

【課題を解決するための手段】前記課題を解決するためにこの発明が手段とするところは、以下のとおりである。

【０００６】この発明においては不織布製ワイパーを前提とし、その不織布製ワイパーが繊維素材からなり、少なくとも片面に多数の起伏を有し、かつ少なくとも次の工程を含む製造方法によって得られることを特徴としている。

ａ．少なくとも一層の親水性繊維ウエブと、少なくとも一層の熱捲縮性の疎水性繊維ウエブとからなる積層体を得る工程。

ｂ．連続した平面部と、間欠的かつ独立して分布する多数の凸部および／または凹部と、多数の微細排水孔とを備えた支持体表面上において、前記積層体に微細孔ノズルから高圧水を噴射し、前記両ウエブの繊維を交絡させるとともに再配列して積層体の面方向に繊維の分布密度にむらを有する不織布を得る工程。

ｃ．その不織布を脱水および／または乾燥したのち、熱処理して前記合成繊維を捲縮させる工程。

【０００７】かかるワイパーの好ましい態様においては、その平均摩擦係数（ＭＩＵ）が０．５０～０．７０であって、より好ましくは、その摩擦係数の平均偏差（ＭＭＤ）が０．０１～０．０２である。

【０００８】

【作用】このように構成した不織布製ワイパーにおいては、ウエブからなる積層体に高圧水を噴射すると、積層体の構成繊維が互いに交絡するとともに再配列して支持体の凸部の周囲および／または凹部の中に相対的に多く集積し、支持体の面方向に沿って繊維の分布密度にむらのある柔軟な不織布を得ることができる。この不織布を熱処理して合成繊維を捲縮させると、密度の高い部分は相対的に多くの合成繊維が捲縮することにより、密度の低い部分に比べて高く隆起し、不織布表面に当初存在した起伏よりさらに高低差の大きい起伏を形成する。

【０００９】かかる不織布製ワイパーでは、その隆起部に集積している捲縮した合成繊維が湿潤状態でも剛性を失うことがなく、隆起部は容易に潰滅することがない。

【００１０】

【実施例】この発明に係る不織布製ワイパーの詳細を添付の図面を参照して説明すると、以下のとおりである。

【００１１】図１は、ワイパー１を部分的に拡大して示す模式的な部分破断斜視図である。ワイパー１は、上面２と下面３とを有し、上面２は不定形な隆起部４と隆起部４間の不定形な谷部５とからなる多数の起伏を有し、下面３は平坦である。ワイパー１の断面で明らかなように、上面２近傍には捲縮状態にある疎水性の合成繊維７が相対的に多く、下面３近傍には直状またはゆるやかに屈曲する親水性のレーヨン繊維８が相対的に多く存在し、合成繊維７とレーヨン繊維８とは各々の繊維どうしが機械的に交絡するとともに、合成繊維７とレーヨン繊維８とが互いに交絡し、それによって繊維７，８は不織布を形成している。繊維７，８各々の分布密度（不織布の単位面積当りの繊維の本数）は谷部５よりも隆起部４において高い。

【００１２】かかるワイパー１は、水や薬液を予め含浸させ、上面２をテーブルや壁面などの対象物に向けて使用する。水などは、親水性のレーヨン繊維に保持され、ワイパー１に力を加えると徐々に滲出して汚れの拭き取りを円滑にする。上面２の隆起部４は、対象物の汚れを掻き取るように作用し、谷部５は、掻き取った汚れを水などと共にワイパー１の外へ排出するための流路として作用する。隆起部４は、主として疎水性の合成繊維７が機械的に絡みあうことで構成されているから、ワイパー１が水を含んでもその剛性は低下することがなく、また容易に潰滅することもない。したがって、このワイパー１は、終始高い掻き取り効果と汚れの排出効果とを有する。

【００１３】図２、３は、ワイパー１の他の実施態様を示す模式的な拡大端面図である。図２のワイパー１は、上下面２，３各々に隆起部４と谷部５とを有し、隆起部４の上下面２，３の近傍には捲縮した合成繊維７があり、上下面２，３の中間にレーヨン繊維８がある。なお、隆起部４において、いずれの繊維７，８も分布密度が高いこと、隆起部４が主として捲縮した合成繊維７によって構成されていること、繊維７，８が機械的に交絡して不織布を形成していることは、図１の態様と同じである。図３のワイパー１は、図２のそれと同様に上下面２，３に隆起部４と谷部５とを有するが、隆起部４の上下面２，３の近傍にレーヨン繊維８を有し、上下面２，３の中間に合成繊維７を有する点が異なる。このワイパー１には、上下面２，３からの水の滲出が速やかになるという利点があり、また、隆起部４は、捲縮した合成繊維７が核を成しているから、容易に型崩れすることがない。なお、図２、３において、上下面２，３の隆起部４どうし、谷部５どうしは、それらの位置がほぼ一致しているが、それらが一致していなくてもワイパー１の機能に支障はない。

【００１４】図４は、図１に示したワイパー１の製造工程を示す模式図である。この工程は、ウエブ供給工程５０、含浸工程５１、第１次高圧水処理工程５２、第２次高圧水処理工程５３、脱水乾燥工程５４、熱処理工程５５、および巻取工程５６からなる。

【００１５】ウエブ供給工程５０においては、図の右方向へ走行する無端ベルト６０の上に第１ランダムウエバー６１から親水性繊維８のウエブ６２を連続的に供給し、続いてウエブ６２の上に第２ランダムウエバー６３から熱捲縮性の疎水性合成繊維７のウエブ６４を連続的に供給し、両ウエブ６２，６４からなるウエブ積層体６５をつくる。

【００１６】含浸工程５１においては、積層体６５の幅全体に上方から流水６６をゆるやかに供給して含浸させ、その地合いを落ち着かせることにより積層体６５の走行の円滑化を図る。

【００１７】第１次高圧水処理工程５２においては、積層体６５を平滑な周面に直径０．２～２．０ｍｍの排水用微細孔を５～５０％の面積率で有し、右へ回転する第１支持ロール６７へ導き、ロール６７の幅方向と周方向とに列設した多数の噴射ノズル６８から、２０～１００ｋｇ／ｃｍ²の高圧水を０．５～２０ｌ／ｍ²の割合で、噴射し、積層体６５を構成する繊維７，８を互いに機械的に交絡させる。第１支持ロール６７内部には、排水を促すためのサクション手段（図示せず）が設けてある。

【００１８】第２次高圧水処理工程５３においては、平滑な周面に直径０．３～１５ｍｍ、高さ０．４～１０ｍｍの半球状突起を１～１５ｍｍのピッチで有し、かつ、直径０．２～２．０ｍｍの排水孔を２～３５％の面積率で有する右回転の第２支持ロール６９の上に第１支持ロール６７で交絡した積層体６５を導く。この積層体６５をノズル６９Ａにより前記工程５２と同様に、ただし、好ましくはそれよりも高圧かつ高給水量の噴射水で処理して繊維７，８を前記半球状突起の先端部から基端部周囲へと移動、再配列させる。そうすることにより、繊維７，８は、その基端部周囲に多くが集積して、先端部で希薄となり、平面方向に繊維の分布密度にむらを持つ不織布７０を形成する。不織布７０が第２支持ロール６９に接触した面にはロール６９の表面が一部分写しとられ、高圧水を噴射した面には噴射部位にくぼんだ条痕が生じ、これらが両表面に高低差の小さい起伏をつくっている。

【００１９】なお、含浸工程５１から第２次高圧水処理工程５３に至る工程の詳細は、本願と同一の出願人に係る特開昭６２－１２５０５８号公報に開示の技術内容と実質的に同じであるから、その説明を割愛する。

【００２０】次に、乾燥工程５４では、前の工程５３で湿潤状態にある不織布７０に真空によるサクションを作用させて脱水し、さらに温風を送って乾燥する。

【００２１】熱処理工程５５では、不織布７０を所要温

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度にまで加熱し、熱捲縮性の合成繊維７を捲縮させる。不織布７０は、その捲縮によって、合成繊維７の集積している部分が隆起して図１の隆起部４となり、繊維７の希薄な部分は殆ど隆起することがなく谷部５となって、両部４，５は工程５０～５４までは得ることのできない大きな高低差を有する起伏を形成している。合成繊維７は、不織布７０の主として上面２に存在するから、隆起部４と谷部５も主として上面２に形成される。かかる不織布７０は、ワイパー１の原反となるものであって、次の工程５６で巻き取った後、所要寸法に裁断して使用する。

【００２２】このような製造工程において、より好ましいワイパー１を得るには、疎水性の合成繊維７として熱収縮温度が違う２種類の合成樹脂からなるサイド・バイ・サイド型、または芯鞘型の周知複合繊維を不織布７０の２０～８０重量%の範囲で使用し、親水性繊維８としては、レーヨン繊維や粉砕パルプなどの天然繊維、親水化処理した合成繊維などを不織布７０の８０～２０重量%の範囲で使用する。また、合成繊維７や親水性繊維８には、それらと性質の異なる第３の繊維を３０重量%を限度として混合することができる。例えば、合成繊維７にその中の３０重量%に当る非捲縮性合成繊維を混合することができる。ワイパー１は、その坪量が３０～２００ｇ／m^2となるように合成繊維７と親水性繊維８とを組み合わせ、ワイパー１の平均摩擦係数（ＭＩＵ）が０．５０～０．７０であって、好ましくは摩擦係数の平均偏差（MMD）が０．０１～０．０２の範囲におさまるようにそれら繊維７，８の繊度や捲縮の程度、使用割合を選定する。ここで、ＭＩＵは滑りにくさの指標であり、MMDはざらつきの指標であって、それらは日本繊維機械学会発行「風合い評価の標準化と解析」（第２版）に詳述されている。かかる数値特性を有するワイパー１は、汚れを掻き取る性能が特に優れている。

【００２３】なお、図４では、ウエブ６２と６４とからなる二層構造の積層体６５について説明したが、いずれか一方のウエブにもう一方のウエブをさらに重ね、全体として三層からなる積層体６５をワイパー１にすること＊もできる。また、第２次高圧水処理工程５３では、第２支持ロール６９の表面に半球状突起に替えて微細な凹部を設けることもできる。この場合には、高圧水を噴射された積層体６５の構成繊維が、その凹部の中へ流れ込んで集積する一方、ロール６９の平滑面では希薄になる。

【００２４】

【発明の効果】この発明に係るワイパーは、構成繊維が機械的に交絡した不織布でできているから、肌触りが柔軟である。その表面には、多数の比較的高低差の大きい起伏を有するから、その隆起部で効率よく汚れを掻き取ることができる。かかる隆起部は、主として捲縮した合成繊維で構成されており、その繊維が湿潤状態でも剛性を失うことがないから、簡単に潰滅することがない。

【００２５】かかるワイパーは、熱捲縮性の疎水性合成繊維の分布密度にむらをもたせ、その合成繊維を捲縮させることで起伏を形成するから、不織布製造工程で得ることができる起伏よりもさらに高低差の大きい起伏を容易に得ることができる。

【図面の簡単な説明】

【図１】ワイパーの模式的な拡大斜視図。

【図２】実施態様の一例を示すワイパーの端面図。

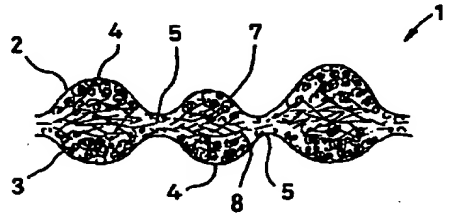
【図３】実施態様の他の一例を示すワイパーの端面図。

【図４】ワイパーの製造工程の模式図。

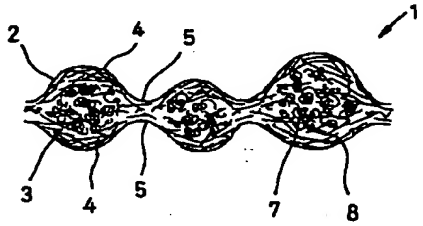
【符号の説明】

１	ワイパー
２	上面
３	下面
４	隆起部
５	谷部
７	疎水性捲縮繊維
８	親水性繊維
６２	ウエブ
６４	ウエブ
６５	積層体
６７	第１支持ロール
６９	第２支持ロール
７０	不織布

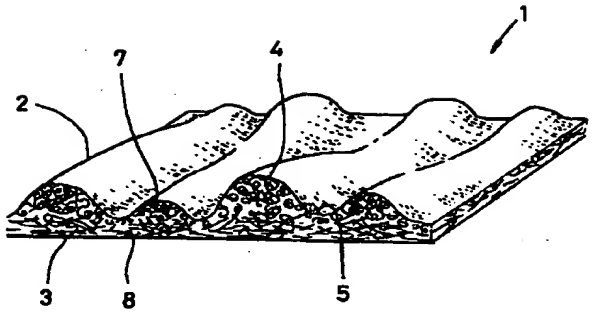
【図２】



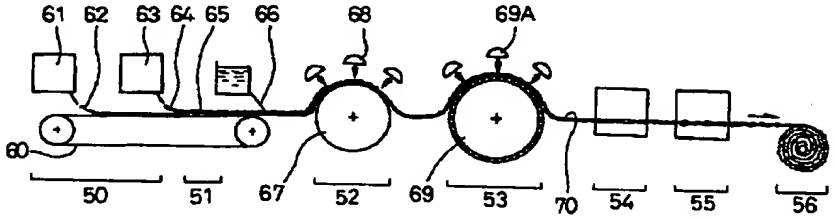
【図３】



【図１】



【図４】



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